

**AMENDMENTS TO THE CLAIMS**

1. (Currently amended)) An optical head having:
  - a bobbin formed with a center hole and
  - a first optical lens mounted on said bobbin via a thermal expansion adjustment member formed with an opening,
  - said first optical lens having a substrate formed by an optical material different from said bobbin in coefficient of thermal expansion,
  - said substrate having:
    - a convex part functioning as a convex lens and
    - a flat part positioned around said convex part,
    - said flat part is fixed to said thermal expansion adjustment member so that said convex part fits in said opening, and
    - said first optical lens is placed so that a center axis of said convex part or an extension thereof passes through the center hole of said bobbin, wherein
  - the coefficient of thermal expansion of said thermal expansion adjustment member is a value between the coefficient of thermal expansion of said bobbin and the coefficient of thermal expansion of said first optical lens.
2. (Cancelled)
3. (Original) An optical head as set forth in claim 1, wherein said thermal expansion adjustment member is fixed to said bobbin.
4. (Original) An optical head as set forth in claim 1, wherein said thermal expansion adjustment member is fixed to said bobbin via a spacer.
5. (Original) An optical head as set forth in claim 1, wherein a second optical lens is arranged at the center hole of said bobbin.
6. (Currently Amended) An optical head having:
  - a bobbin formed with a center hole and

a first optical lens mounted on said bobbin via a thermal expansion adjustment member formed with an opening,

said first optical lens having a substrate formed by an optical material different from said bobbin in coefficient of thermal expansion,

said substrate having:

a convex part functioning as a convex lens and

a flat part positioned around said convex part,

said flat part is fixed to said thermal expansion adjustment member so that said convex part fits in said opening, and

said first optical lens is placed so that a center axis of said convex part or an extension thereof passes through the center hole of said bobbin [An optical head as set forth in claim 1], wherein

said thermal expansion adjustment member is an optical material having a constant or substantially constant thickness and is formed by the same material as the optical material of said first optical lens and

the height of said convex part from the surface of said flat part is lower than the thickness of said thermal expansion adjustment member.

7. (Currently Amended) An optical head having:

a bobbin formed with a center hole and

a first optical lens mounted on said bobbin via a thermal expansion adjustment member formed with an opening,

said first optical lens having a substrate formed by an optical material different from said bobbin in coefficient of thermal expansion,

said substrate having:

a convex part functioning as a convex lens and

a flat part positioned around said convex part,

said flat part is fixed to said thermal expansion adjustment member so that said convex part fits in said opening, and

said first optical lens is placed so that a center axis of said convex part or an extension thereof passes through the center hole of said bobbin [An optical head as set forth in claim 1], wherein:

the center axis of said convex part coincides or substantially coincides with the center axis of the center hole of said bobbin;

a groove is formed around said convex part;

a coil is wound around an outer circumference of said bobbin;

the material of said bobbin is plastic; and

the material of said first optical lens is glass.

8. (Original) An optical head having:

a bobbin formed with a center hole and

an optical lens mounted on said bobbin via a thermal expansion adjustment

member,

said optical lens having a substrate formed by an optical material different from said bobbin in coefficient of thermal expansion,

said substrate having:

a convex part functioning as a convex lens;

a flat part positioned around said convex part; and

an outer circumference part positioned around said flat part, wherein

a thickness of said outer circumference part is greater than that of said convex

part;

said outer circumference part is fixed to said thermal expansion adjustment

member; and

said optical lens is placed so that a center axis of said convex part or an extension thereof passes through the center hole of said bobbin.

9. (Original) An optical head as set forth in claim 8, wherein a coefficient of thermal expansion of said thermal expansion adjustment member is a value between the coefficient of thermal expansion of said bobbin and the coefficient of thermal expansion of said optical lens.

10. (Original) An optical head as set forth in claim 8, wherein said thermal expansion adjustment member is fixed to said bobbin.

11. (Original) An optical head as set forth in claim 8, wherein said thermal expansion adjustment member is an optical material having a constant or substantially constant thickness and is formed by the same material as the optical material of said optical lens.

12. (Original) An optical head as set forth in claim 8, wherein said thermal expansion adjustment member is formed with an opening and said optical lens is placed so that said convex part protrudes to said opening.

13. (Original) An optical head as set forth in claim 8, wherein a mask layer is formed on a surface of said outer circumference part and said mask layer of said outer circumference part is fixed to said thermal expansion adjustment member.

14. (Original) An optical head as set forth in claim 8, wherein  
the center axis of said convex part coincides or substantially coincides with the center axis of the center hole of said bobbin;  
a groove is formed around said convex part;  
a coil is wound around an outer circumference of said bobbin;  
the material of said bobbin is plastic; and  
the material of said optical lens is glass.

15. (Original) An optical head having:  
a bobbin formed with a center hole and  
an optical lens,  
said optical lens having a substrate formed by an optical material different from said bobbin in coefficient of thermal expansion,  
said substrate having:  
a convex part functioning as a convex lens;  
a flat part positioned around said convex part; and  
an outer circumference part positioned around said flat part, wherein  
a thickness of said outer circumference part is greater than that of said convex part;  
said outer circumference part is fixed to said bobbin; and

said optical lens is placed so that a center axis of said convex part or an extension thereof passes through the center hole of said bobbin.

16. (Original) An optical head as set forth in claim 15, wherein a mask layer is formed on a surface of said outer circumference part and said mask layer of said outer circumference part is fixed to said bobbin.

17. (Original) An optical head as set forth in claim 15, wherein  
the center axis of said convex part coincides or substantially coincides with the center axis of the center hole of said bobbin;  
a groove is formed around said convex part;  
a coil is wound around an outer circumference of said bobbin;  
the material of said bobbin is plastic; and  
the material of said optical lens is glass.

18. (Currently Amended) An optical pickup having:  
an optical head functioning as an object lens part when mounted in a recording and/or reproducing apparatus of an optical storage medium and  
a photodetector for receiving a reflected light beam for use in recording and/or reproduction to and from the optical storage medium,  
said optical head having  
a bobbin formed with a center hole and  
a first optical lens mounted on said bobbin via a thermal expansion adjustment member formed with an opening,  
said first optical lens having a substrate formed by an optical material different from said bobbin in coefficient of thermal expansion,  
said substrate having  
a convex part functioning as a convex lens and  
a flat part positioned around said convex part,  
said flat part is fixed to said thermal expansion adjustment member so that said convex part fits in said opening, and

said first optical lens is placed so that a center axis of said convex part or an extension thereof passes through the center hole of said bobbin, wherein

the coefficient of thermal expansion of said thermal expansion adjustment member is a value between the coefficient of thermal expansion of said bobbin and the coefficient of thermal expansion of said first optical lens.

19. (Canceled)

20. (Original) An optical pickup as set forth in claim 18, wherein said thermal expansion adjustment member is fixed to said bobbin.

21. (Original) An optical pickup as set forth in claim 18, wherein said thermal expansion adjustment member is fixed to said bobbin via a spacer.

22. (Original) An optical pickup as set forth in claim 18, wherein  
a second optical lens is placed at the center hole of said bobbin and  
a light beam is supplied irradiated from a recording and/or reproducing light beam generating apparatus and passed through said second optical lens to said first optical lens.

23. (Currently Amended). An optical pickup having:

an optical head functioning as an object lens part when mounted in a recording and/or reproducing apparatus of an optical storage medium and

a photodetector for receiving a reflected light beam for use in recording and/or reproduction to and from the optical storage medium,

said optical head having

a bobbin formed with a center hole and

a first optical lens mounted on said bobbin via a thermal expansion adjustment member formed with an opening,

said first optical lens having a substrate formed by an optical material different from said bobbin in coefficient of thermal expansion,

said substrate having

a convex part functioning as a convex lens and

a flat part positioned around said convex part,  
said flat part is fixed to said thermal expansion adjustment member so that said  
convex part fits in said opening, and  
said first optical lens is placed so that a center axis of said convex part or an  
extension thereof passes through the center hole of said bobbin [An optical pickup as set  
forth in claim 18], wherein

said thermal expansion adjustment member is an optical material having a  
constant or substantially constant thickness and is formed by the same material as said first  
optical lens and

the height of said convex part from the surface of said flat part is lower than the  
thickness of said thermal expansion adjustment member.

24. (Currently Amended) An optical pickup having:

an optical head functioning as an object lens part when mounted in a recording  
and/or reproducing apparatus of an optical storage medium and

a photodetector for receiving a reflected light beam for use in recording and/or  
reproduction to and from the optical storage medium,

said optical head having

a bobbin formed with a center hole and

a first optical lens mounted on said bobbin via a thermal expansion adjustment  
member formed with an opening,

said first optical lens having a substrate formed by an optical material different  
from said bobbin in coefficient of thermal expansion,

said substrate having

a convex part functioning as a convex lens and

a flat part positioned around said convex part,

said flat part is fixed to said thermal expansion adjustment member so that said  
convex part fits in said opening, and

said first optical lens is placed so that a center axis of said convex part or an  
extension thereof passes through the center hole of said bobbin [An optical pickup as set  
forth in claim 18], further having a magnet,

the center axis of said convex part coincides or substantially coincides with the center axis of the center hole of said bobbin,

a groove is formed around said convex part,

a coil is wound around an outer circumference of said bobbin,

the material of said bobbin is plastic,

the material of said first optical lens is glass, and

said magnet and said coil configure an actuator for moving said bobbin.

25. (Original) An optical pickup having:

an optical head functioning as an object lens part when mounted in a recording and/or reproducing apparatus of an optical storage medium and

a photodetector for receiving a reflected light beam for use in recording and/or reproduction to and from the optical storage medium,

said optical head having

a bobbin formed with a center hole and

an optical lens mounted on said bobbin via a thermal expansion adjustment member,

said optical lens having a substrate formed by an optical material different from said bobbin in coefficient of thermal expansion,

said substrate having:

a convex part functioning as a convex lens;

a flat part positioned around said convex part; and

an outer circumference part positioned around said flat part,

a thickness of said outer circumference part is greater than that of said convex part,

said outer circumference part is fixed to said thermal expansion adjustment member, and

said optical lens is placed so that a center axis of said convex part or an extension thereof passes through the center hole of said bobbin.

26. (Original) An optical pickup as set forth in claim 25, wherein a coefficient of thermal expansion of said thermal expansion adjustment member is a value between the



coefficient of thermal expansion of said bobbin and the coefficient of thermal expansion of said optical lens.

27. (Original) An optical head as set forth in claim 25, wherein said thermal expansion adjustment member is fixed to said bobbin.
28. (Original) An optical pickup as set forth in claim 25, wherein  
said thermal expansion adjustment member is an optical material having a  
constant or substantially constant thickness and is formed by the same material as said optical  
lens and  
a light beam is supplied irradiated from a recording and/or reproducing light  
beam generating apparatus and passed through said thermal expansion adjustment member.
29. (Original) An optical pickup as set forth in claim 25, wherein  
said thermal expansion adjustment member is formed with an opening and  
said optical lens is placed so that said convex part protrudes to said opening.
30. (Original) An optical pickup as set forth in claim 25, wherein a mask layer is  
formed on a surface of said outer circumference part and said mask layer of said outer  
circumference part is fixed to said thermal expansion adjustment member.
31. (Original) An optical pickup as set forth in claim 25, further having a magnet,  
the center axis of said convex part coincides or substantially coincides with the  
center axis of the center hole of said bobbin,  
a groove is formed around said convex part,  
the material of said bobbin is plastic,  
the material of said optical lens is glass, and  
said magnet and said coil configure an actuator for moving said bobbin.
32. (Original) An optical pickup having:  
an optical head functioning as an object lens part when mounted in a recording  
and/or reproducing apparatus of an optical storage medium and

a photodetector for receiving a reflected light beam for use in recording and/or reproduction to and from the optical storage medium,  
said optical head having  
a bobbin formed with a center hole and  
an optical lens,  
said optical lens having a substrate formed by an optical material different from said bobbin in coefficient of thermal expansion,  
said substrate having:  
a convex part functioning as a convex lens;  
a flat part positioned around said convex part; and  
an outer circumference part positioned around said flat part,  
said outer circumference part is fixed to said bobbin, and  
said optical lens is placed so that a center axis of said convex part or an extension thereof passes through the center hole of said bobbin, further having a magnet,  
the center axis of said convex part coincides or substantially coincides with the  
center axis of the center hole of said bobbin,  
a groove is formed around said convex part,  
the material of said bobbin is plastic,  
the material of said optical lens is glass, and  
said magnet and said coil configure an actuator for moving said bobbin.

33. (Original) An optical pickup as set forth in claim 32, wherein a mask layer is formed on a surface of said outer circumference part and said mask layer of said outer circumference part is fixed to said bobbin.

34. (Cancelled)